

Method for representing animated menu buttons**Field of the invention**

5 This invention relates to a method for adding animated menu buttons to an optical storage medium.

10 Background

Today's optical storage media formats are capable of supporting visual menus, e.g. for content management or control functions. Applications of such visual menus are the 15 selection of one out of multiple titles on the disc, the selection of a chapter within a title, and others. From the user perspective, such menus consist of a number of buttons shown on the display. The user may navigate within the menu, e.g. by pushing the up, down, left and right buttons on his 20 remote control to select a menu button, and may activate a menu button through some kind of "OK" button on the remote control. An indicator, usually a highlight or an arrow, may provide feedback to the user, showing which button is currently selected or activated. A menu button may have one of 25 the states "normal", "selected" or "activated".

However, known DVD menus are rather limited concerning extra features, since they contain only static visual buttons.

30 Further, a subtitling specification contained in the document "ETS 300 743: Digital Video Broadcasting (DVB); Subtitling System" (DVB-ST), provided by the European Telecommunication

Standardization Institute (ETSI), is known for embedding subtitles into video sequences.

5 Summary of the Invention

The present invention may be utilized to give more feedback to the user who operates a menu related to an optical storage medium. The feedback comprises visually and/or aurally 10 animated buttons. A method to provide such feedback is disclosed in claim 1.

A storage medium that contains an animated menu is disclosed in claim 9.

15 An apparatus suitable for presenting such menu is disclosed in claim 10.

According to the invention, a menu button shown on a display 20 may look different, depending on its state. The state may be "normal", "selected" or "activated", and for each of these states the button may have different color or shape.

Additionally, a sound or sound sequence may be attached to some or all menu buttons, depending on the buttons state. 25 Examples for sounds are a click or a melody, or a speech sequence. The current invention provides a data structure by which those additional features can be described.

Advantageous embodiments of the invention are disclosed in the 30 dependent claims, the following description and the figure.

Brief description of the drawing

An exemplary embodiment of the invention is described with reference to the accompanying drawing in Fig.1, which shows an 5 on-screen menu according to the invention, and a corresponding remote control.

Detailed description of the invention

10 Fig.1 shows a video screen 1 containing a menu that comprises buttons 2,3 and related text describing the buttons. When a user presses a button 5,6 on a remote control 4, the state of a button 2,3 may change, and also the representation of the 15 button. In Fig.1 one button 2 is selected, and thus looks different from the unselected buttons 3. When the user e.g. presses the "right" button 6 on the remote control, another button 3 is selected being right from the currently selected button 2. When the user presses the "OK" button 5, the 20 selected button is activated, and the function associated with the selected button is performed. The selected button 2 according to the invention is animated, e.g. has another color and another shape than an unselected button 3, and its color or shape may change. Particularly, the button may also be 25 replaced by a moving symbol, a moving cartoon or the like, depending on the state.

A preferred embodiment of the invention is based on the syntax and semantics of the subtitling specification contained in the 30 document "ETS 300 743: Digital Video Broadcasting (DVB); Subtitling System" (DVB-ST), provided by the European Telecommunication Standardization Institute (ETSI). To provide enhanced capabilities for menus relating to optical storage

media, the page composition segment defined in DVB-ST is extended to describe animated menu buttons and to associate a sound or sound sequence to a button. The enhanced page composition segment is herein called a "menu page composition segment".

This invention, like DVB_ST, uses page composition segments to describe the position of one or more rectangular regions on the display, assuming that a region contains a representation 10 of one button in a certain state, e.g. as pixel data or bitmap. Each button image is thus addressable through an identifier (ID), or "region_id". In this embodiment of the invention, backward compatibility is kept with DVB-ST by using an associated segment type ID for the menu page composition 15 segment. The menu page composition segment is defined as listed in Tab.1.

The "menu page composition segment" according to the invention may also replace the original page composition segment, e.g. 20 in DVB-ST. A menu page composition segment describes a menu and provides the necessary layout and timing information as well as additional control information.

In one embodiment of the invention, being a simple case with 25 static menus, each button is represented by e.g. three images. A first image represents the button in the "normal" state, a second image represents the button in the "selected" state and a third image represents the button in the "activated" state. These images may be stored e.g. as bitmap files on the storage 30 medium, and may be used to display the menu.

In another embodiment, going beyond static menus, the menu page composition segment also allows to describe animated

buttons. In this case, the "normal" state and the "selected" state of a button are each represented through a series of images that are displayed, and may be e.g. cyclically repeated, on the screen to achieve the animation effect. Also 5 for the "activated" state of a button an animation can be defined, but here it may be advantageous to display the animation phases only once, because the menu will usually disappear or be modified after a button was activated.

10 For all button animations of a menu the menu author can specify an animation frame rate, defining how long each phase of an animation is displayed.

Advantageously, the invention also provides the possibility to 15 give aural feedback to the user. If a button is either in the "selected" state or in the "activated" state, it may be assigned a sound identifier associated with a sound, which may be stored on the storage medium. The associated sound is played back when the button enters the respective button 20 state. In one embodiment of the invention the associated sound is played back repeatedly, as long as the button is in the respective state.

The structure of the menu page composition segment and the 25 semantics of the fields of the menu page composition segment are based on the structure and semantics given in DVB-ST, Section 7.2.1 "Page composition segment". Additional semantics definitions are used for an enhanced menu according to the invention.

30

Tab.1 shows the structure of a menu page composition segment according to the invention. Lines 1-8 are identical to the subtitle segment of the DVB-ST standard, giving the

possibility to keep backward compatibility. The meaning of the fields shown in Tab.1 is described in the following. The addressing of pixels is based on a coordinate system whose origin is defined by the top-left corner of the associated video screen. Pixel addresses increase from left to right and from top to bottom. The dimensions of the associated video are defined as `video_width * video_height`.

| | Field | Size | Type |
|----|---|------|--------|
| 1 | menu_page_composition_segment () { | | |
| 2 | sync_byte | 8 | bslbf |
| 3 | segment type | 8 | bslbf |
| 4 | page id | 16 | bslbf |
| 5 | segment length | 16 | uimsbf |
| 6 | page time out | 8 | uimsbf |
| 7 | page version number | 4 | uimsbf |
| 8 | page state | 2 | bslbf |
| 9 | animation frame rate code | 4 | uimsbf |
| 10 | reserved | 6 | bslbf |
| 11 | while (processed_length < segment_length) { | 8 | uimsbf |
| 12 | button number | 16 | uimsbf |
| 13 | button horizontal address | 16 | uimsbf |
| 14 | button vertical address | | |
| 15 | neighbour info() | 8 | uimsbf |
| 16 | upper button number | 8 | uimsbf |
| 17 | lower button number | 8 | uimsbf |
| 18 | left button number | 8 | uimsbf |
| 19 | right button number | 8 | uimsbf |
| 20 | normal state info() | 8 | uimsbf |
| 21 | start region id normal | 8 | uimsbf |
| 22 | end region id normal | 8 | uimsbf |
| 23 | selected state info() | 16 | uimsbf |
| 24 | start region id selected | 8 | uimsbf |
| 25 | end region id selected | 8 | uimsbf |
| 26 | action state info() | | |
| 27 | start region id activated | 8 | uimsbf |
| 28 | end region id activated | 8 | uimsbf |
| 29 | button command info() | | |
| 30 | sound info() | | |
| 31 | selected sound id | 8 | uimsbf |
| 32 | activated sound id | 8 | uimsbf |
| 33 | } | | |
| 34 | } | | |

Tab.1: Syntax of a menu page composition segment

A segment is generally a data unit within the storage area. The *segment_type* defines its type. The menu page composition segment may be identified by setting e.g. *segment_type* = 0x18, since this value is not used in DVB-ST yet. The other fields 5 in lines 2-8 of Tab.1 define the segment data set.

The *animation_frame_rate_code* field specifies the frame rate of animations in the case of animated buttons being used. It applies to a range of regions specified by *start_region_id_xxx* 10 and *end_region_id_xxx*, with the "xxx" referring the state of a button. If a *start_region_id_xxx* and its corresponding *end_region_id_xxx* differ, they define a range of regions that shall be presented with this animation frame rate. For the normal and selected state, the presentation may be cyclically 15 repeated; for the "activated" state, the presentation shall be performed only once. When any *start_region_id_xxx* is identical to the associated *end_region_id_xxx*, this designates a static or non-animated button state. Only the region designated by *start_region_id_xxx* is displayed, and for that button state 20 the *animation_frame_rate_code* shall have no meaning.

Tab.2 shows an exemplary list of *animation_frame_rate_codes*. An animation may be visible at full video frame rate, e.g. 30 pictures per second, meaning that with each video frame 25 another phase of the animation is displayed. It may also be sufficient to display only with every other video frame another phase of the animated button, thus achieving another effect. Further, it is possible to define the frame rate to either be relative or absolute. Therefore the values of the 30 *animation_frame_rate_code* field have two different meanings, depending on if an associated video is present. In this case the *animation_frame_rate_code* gives the animation frame rate

relative to the video frame rate, otherwise it gives the absolute frame rate.

| animation_frame_rate_code | Relative animation frame rate | Abs. animation Frame rate |
|---------------------------|-------------------------------|---------------------------|
| 0x0 | Reserved | Reserved |
| 0x1 | Full video frame rate | 30 Hz |
| 0x2 | ½ of video frame rate | 15 Hz |
| 0x3 | ¼ of video frame rate | 8 Hz |
| 0x4 | 1/8 of video frame rate | 4 Hz |
| 0x5 | 1/16 of video frame rate | 2 Hz |
| 0x6 | 1/32 of video frame rate | 1 Hz |
| 0x7 - 0xF | reserved | Reserved |

5

Tab.2: Example of animation_frame_rate_code

The button_number field specifies a number that is an internal identifier for a button, and is used for the fields defined

10 below, e.g. the neighbour_info() field. Additionally, when button_number is entered directly through the user interface (UI), the associated button may be activated. Therefore a button_number is unique within the menu. It may be e.g. a two-digit number in the range between 0 and 99.

15

Some fields used for menu animation according to the invention must be specified separately for each button. They are listed from line 11 of Tab.1, where a loop over all buttons starts.

Each instance of the loop refers to one button. Implicitly,

20 the button described by the first instance of the while-loop within menu_page_composition_segment() may be considered as "selected" when entering the menu, and may be considered as "activated" if a page timeout for the menu is set and becomes active.

25

The button_horizontal_address field specifies the horizontal address of the top left pixel of the button. The specified horizontal position may be in between 0 and video_width-1. Likewise, the button_vertical_address field specifies the 5 vertical address of the top left pixel of the button. The specified vertical position may be in between 0 and video_height-1.

The upper_button_number field specifies the button to be 10 selected when the user navigates upward from the current button. The lower_button_number field specifies the button to be selected when the user navigates downward from the current button. The left_button_number field specifies the button to be selected when the user navigates left from the current 15 button. And the right_button_number field specifies the button to be selected when the user navigates right from the current button.

The start_region_id_normal field specifies the ID of the first 20 region to be presented for a button presentation in normal state, and the end_region_id_normal field specifies the ID of the last region to be presented for a button presentation in normal state. All regions with an ID between and including start_region_id_normal and end_region_id_normal shall exist; 25 if start_region_id_normal differs from end_region_id_normal, that range of regions shall be presented cyclically with the animation frame rate as defined by animation_frame_rate_code.

The start_region_id_selected field specifies the ID of the 30 first region to be presented for a button presentation in the selected state, and the end_region_id_selected field specifies the ID of the last region to be presented for a button presentation in the selected state. All regions with IDs

between `start_region_id_selected` and `end_region_id_selected` shall exist; if `start_region_id_selected` differs from `end_region_id_selected`, that range of regions shall be presented cyclically with the animation frame rate described
5 by `animation_frame_rate_code`.

The `start_region_id_activated` field specifies the ID of the first region to be presented for a button presentation in activated state, and the `end_region_id_activated` field
10 specifies the ID of the last region to be presented for a button presentation in activated state. All regions with IDs between `start_region_id_activated` and `end_region_id_activated` shall exist; if `start_region_id_activated` differs from `end_region_id_activated`, that range of regions shall be
15 presented once with the animation frame rate described by `animation_frame_rate_code`.

The `button_command_info()` field serves as a container for commands associated with this button, specifying the commands
20 to be performed when the button is activated.

Finally, the `selected_sound_id` field specifies the ID of the sound to be played when the button enters the "selected" state, and the `activated_sound_id` field specifies the ID of the sound to be played when the button enters the "activated" state.
25

The invention may be used particularly for menus stored on
30 Blu-ray discs, but also DVD or other optical or non-optical high-capacity storage media.